SURFACE MORPHOLOGY OF ASIAN CADAVERIC HIPS

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The joint surfaces of 60 hips obtained from the cadavers of elderly Asians were studied to determine the incidence, the grade and the distribution of both non-progressive (age-related) and progressive degenerative changes.

It was observed that in the Asian population of 40 to 90 years of age, non-progressive changes were common, being seen in 66% of the acetabular specimens and 50% of the femoral heads. Only one specimen of the 60 showed unexplained progressive degenerative change. We conclude that primary osteoarthritis of the hip is rare in Asians.

Primary osteoarthritis of the hip is relatively rare in Asians (Gunn 1964; Hodgson 1964; Mukhopadhyaya and Barooah 1967; Byers et al. 1974). Its aetiology is not yet known but some local factors in the hip have been held responsible, including the articular geometry (Greenwald and O’Connor 1971; Greenwald and Haynes 1972; Bullough, Goodfellow and O’Connor 1973), mechanical overload with high stress at areas of contact (Day, Swanson and Freeman 1975; Solomon 1976; Swanson 1977; Adams, Kempson and Swanson 1978) and degenerative changes in the articular cartilage (Goodfellow and Bullough 1967; Byers, Contepomi and Farkas 1970). The low incidence of primary osteoarthritis of the hip in Asians has been related to the frequent use of a squatting posture which may protect the hip by putting it through the extreme ranges of movement (Gunn 1964; Hoaglund, Yau and Wong 1973). Limited studies have been done on the morphology of the Asian hip joint (Byers et al. 1974).

This postmortem study of Asian cadaveric hips aims to throw some light on the aetiology of osteoarthritis of the joint by determining the morphological features of the surfaces.

MATERIAL AND METHODS

Hip joints were obtained from 60 fresh cadavers of average build at postmortem examination; 56 were Chinese and four Indian, of which 32 were left hips and 28 right. Fifty-two hips were from men and eight from women. The average age was 60 years with a range from 40 to 90 years.

Morphology. Each specimen, consisting of the hip joint with the ilium and the proximal half of the femur, was dissected from the fresh cadaver and stored in a sealed plastic bag at a temperature of −20°C. For the investigation a specimen was thawed to room temperature and dissected free of all soft tissues. The opposing articular cartilage of the femoral head and of the acetabulum was inspected macroscopically for surface degenerative changes and any other abnormalities. Drawings and photographs were made, the zones in the hip being classified according to Meachim and Emery (1973). The zones in the acetabulum are termed anterosuperior, superoposterior and inferoposterior (Fig. 1); in the femoral head the zones are foveal, anterior, posterior, superolateral and inferomedial (Fig. 2). The surface changes in the articular cartilage were graded from 1 to 5 in accordance with Byers et al. (1970). Grade 1 had surface granularity. Grade 2 showed superficial fraying, fissuring or flaking. In Grade 3 there was loss of cartilage, in Grade 4 there was ossification at the site of cartilage loss and in Grade 5 bone was exposed at the base of the lesion.

The surfaces of the acetabulum and of the femoral head were then painted with Indian ink to identify areas of surface fibrillation. This technique, described by Meachim (1972), is useful in delineating surface damage to the articular cartilage. Drawings and photographic records were again made.
RESULTS

From inspection and indian ink staining, the degenerative changes at the surface of the articular cartilage of the acetabulum and the femoral head in the 60 hip joints was graded. The results are shown in Figures 3 and 4.

No acetabulum showed any Grade 4 or Grade 5 changes in any area, while in most cases the anterosuperior and inferoposterior areas were either normal or had only Grade 1 changes. In the superoposterior area 17 hips showed Grade 1 changes (Fig. 5), 35 hips had Grade 2 changes and only one hip was normal.
Almost 50% of femoral heads were normal. The maximal changes were seen in the inferomedial area, where there were Grade 1 changes (Fig. 6) in 24 hips, Grade 2 changes in six hips and Grade 4 in two hips. In the other zones, three hips showed Grade 4 changes in the posterior zone, and two of these also showed degenerative changes in the anterior and inferomedial zones (Figs 7 and 8). These latter two hips were, however, associated with severe abnormality of the opposite hip, due in each case to a non-union of an untreated fracture of the neck of the femur. The third hip with Grade 4 changes in the posterior zone had no associated abnormality on the contralateral side.

DISCUSSION
In studies of the hip joint various authors (Byers et al. 1970; Bullough et al. 1973; Byers et al. 1974) have noted two types of degenerative change in articular cartilage. The more common type of change is age-related and is non-progressive or of limited progression, while the less common type is progressive, leading to frank osteoarthritis. In Caucasian populations the non-progressive type is seen in over 80% of those in the sixth and seventh decades of life. In our Asian subjects between the fifth and eighth decades of life non-progressive changes were seen in 66% of the acetabula, and in only 50% of the femoral heads.
Progressive degenerative changes leading to osteoarthritis were seen in 4% of a Caucasian population in the fourth decade and up to 10% of the population in the sixth and seventh decades (Byers et al. 1970). In our Asian study, 57 of the 60 hips showed no progressive degenerative changes. The progressive type of degenerative change was seen in only three hips; two of these hips showed changes in the superoposterior zone of the acetabulum and the corresponding "mirror areas" on the femoral head (Figs 7 and 8). In both cases the opposite hip had an un-united fracture of the neck of the femur and it seems possible that some biomechanical alteration of joint loading had followed the injury and non-union on the opposite side. Thus there was only one specimen of the 60 hips which showed unexplained progressive changes, a much lower proportion than that published for a Caucasian population.

It is concluded that although age-related degenerative changes are not uncommon in Asian hips, progressive degenerative changes leading to osteoarthritis are rare.

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REFERENCES


